

XEROX

Xerox 820 Operation Manual





820 INFORMATION PROCESSOR OPERATIONS MANUAL

WARNING: This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. As temporarily permitted by regulation it has not been tested for compliance with the limits for Class A computing devices pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

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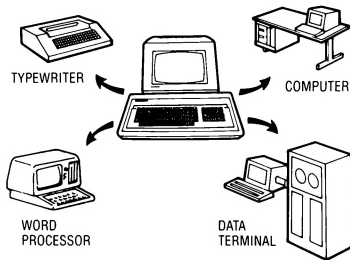
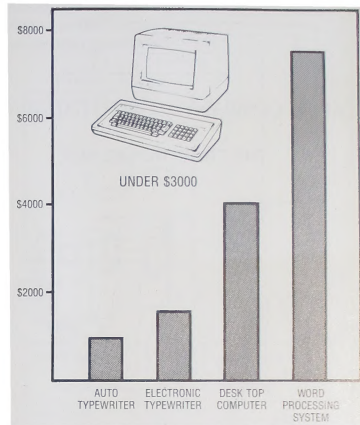
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THE 820 IS THE SOLUTION!

A LOW-COST AFFORDABLE SYSTEM

As your business processing needs increase, so do your requirements for additional equipment.

The 820 gives you an alternative to single function office equipment. In one complete package you'll find all the capabilities required to effectively automate your office routines.



A MULTI-PURPOSE WORK-STATION

The 820 was designed to be multifunctional. It combines a solid hardware design with a wide selection of software, thus handling not only your word processing and typing needs, but also your information and data processing tasks.

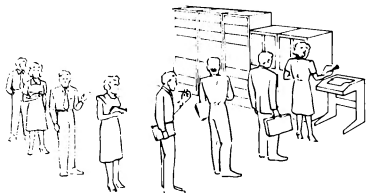
Whether you're a manager or a secretary, the 820 has productivity increasing features that can work for you!

A VEHICLE FOR PRODUCTIVITY INCREASE

In today's high technology marketplace, your firm's productivity is a direct function of your computing and word processing capability.

LARGE COMPANY . . . WITH LARGE OPERATING BUDGET

THE TRADITIONAL WAY



One Computer for
Large Number of Personnel

THE "820" WAY



Individual Computer for
Each Decision-Making Employee

SMALL BUSINESS . . . WITH SMALL OPERATING BUDGET

THE TRADITIONAL WAY

Desktop Computer
\$4,000

Word Processor
\$7,500



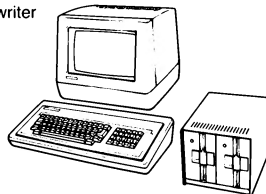
Data Terminal
\$2,500

Typewriter
\$ 900

Each System Is Too
Expensive to Own

THE "820" WAY

- Desk Top Computer
- Data Terminal
- Word Processor
- Typewriter

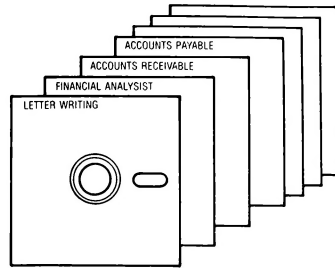


Multi-Function Capability
At an Affordable Price

A GROWTH ORIENTED SYSTEM

EXTENSIVE SOFTWARE LIBRARY AVAILABLE

As a desktop computer, the 820 gives you a cost effective way to automate your daily work routines and manual tasks. The 820 uses the popular CP/M® 2.2 Operating System which opens the door to a virtual warehouse of software packages. You can purchase software directly from Xerox or from other vendors and software clearing houses. Your sales representative can provide you with specific information.



APPLICATIONS ARE USER ORIENTED

Because the 820 is a multifunction machine, it can be used by a multitude of people in a variety of ways.

The versatility of the 820 becomes apparent as you explore the available system features. The inherent system capabilities, coupled with the powerful CP/M Operating System provide the capability to perform many tasks previously handled only by relatively expensive minicomputers. Thus, anyone associated with the processing of information can find an application and a use for the 820.

SECRETARIAL 	<ul style="list-style-type: none"> • WORD PROCESSOR • ELECTRONIC TYPEWRITER • TEXT EDITOR
FINANCIAL 	<ul style="list-style-type: none"> • ELECTRONIC SPREAD SHEET • AUTOMATED PAYROLL • ACCOUNTS RECEIVABLE
ENGINEERING 	<ul style="list-style-type: none"> • ANALYSIS TOOL • DATA TERMINAL • DATA BASE SYSTEMS
MANAGEMENT 	<ul style="list-style-type: none"> • AUTOMATED FORECASTS • LONG RANGE PLANNING • EXPENSE ACCOUNTS
LAW 	<ul style="list-style-type: none"> • OFFICE BILLING • AUTOMATED FORM PREPARATION • LEGAL DATA BASE
ARCHITECTURE 	<ul style="list-style-type: none"> • JOB COSTING • CASH RECEIPTS • CASH DISBURSEMENTS
MEDICAL 	<ul style="list-style-type: none"> • AUTOMATED BILLING • GENERAL LEDGER • PATIENT HISTORIES
ETC.	<ul style="list-style-type: none"> • • •

CP/M® is a registered trademark of Digital Research Incorporated, Pacific Grove, California.

CAPABILITY TO CREATE YOUR OWN SOFTWARE

In addition to the extensive library of CP/M programs, the 820 has several programming languages available. The variety of available languages allows you to choose the most efficient way to write your own software.

Some of the most common programs written by business people are forms fill-in and customized reports.

Below is a partial list of the 820's programming features. Your sales representative can give a more complete listing.

CP/M	All of the features and facilities of the CP/M Operating System are available to you. The CP/M manual provides all the specific details.
BASIC	Several versions of BASIC are available. BASIC-80, from Microsoft, may be purchased directly from Xerox. It meets the ANSI subset standard for BASIC and has many features not found in other BASICs. It's available on 5¼" and 8" disks.
CBASIC II™	CBASIC is the Compiler Systems version of BASIC. It's available through Xerox on 5¼" and 8" disks.
COBOL	Microsoft's COBOL-80 is available through Xerox. It meets the ANSI standard for COBOL and has many features that enhance its efficiency and user ease. COBOL is available through Xerox on 8" disks only.

CBASIC II™ is a trademark of Compiler Systems, Incorporated.

THE 820 SYSTEM



The 820 system is a collection of four components working in unison. The component structure gives you flexibility in placement and system capability.

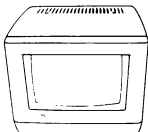
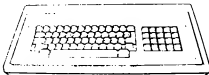
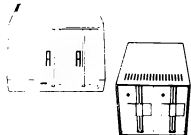
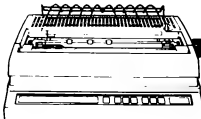
KEYBOARD The keyboard is used to communicate with the system. The keys are organized in standard typewriter style.

DISPLAY (CRT) Similar to a TV screen, the CRT provides clear readable viewing of the material being entered. The display device also houses the computer, which is the heart of the system.

MEMORY (Disk Drives) Disk drives allow the fastest and most convenient means for storing large amounts of information.

PRINTER (Optional) The printer provides hard copy output of the information on the screen or disk.

HARDWARE CAPABILITIES FOR MOST COMPUTING APPLICATIONS

COMPONENT	DESCRIPTION/CAPACITY	TECHNICAL DESCRIPTION																								
	DISPLAY SCREEN <ul style="list-style-type: none">• 24 line display• 80 characters per line• Flicker free screen• White characters on black screen• Automatic repeat of most common characters• Exceeds industry standards	CRT <ul style="list-style-type: none">• 7 × 10 dot matrix PROCESSOR <ul style="list-style-type: none">• Single board Z80* processor• 64K RAM, 4K ROM• Softloaded• Dual parallel ports• Dual serial ports																								
	KEYBOARD <ul style="list-style-type: none">• Standard typewriter key layout• 10 key numeric pad	DATA ENTRY CONSOLE <ul style="list-style-type: none">• Standard 96 character ASCII keyboard• 4 key cursor control• Alpha shift lock• Erasing backspace key																								
	DATA STORAGE* <ul style="list-style-type: none">• 5¼" disk drives hold 40 pages• 8" disk drives hold 120 pages <p>*Single-sided floppy disks</p>	DISK DRIVE PARAMETERS <table><tr><td></td><td>5¼"</td><td>8"</td></tr><tr><td>Tracks</td><td>40</td><td>77</td></tr><tr><td>Sectors/track</td><td>18</td><td>26</td></tr><tr><td>Bytes/Sector</td><td>128</td><td>128</td></tr><tr><td>Disk Capacity</td><td>81K</td><td>241K</td></tr><tr><td>after formatting</td><td></td><td></td></tr><tr><td># Tracks used</td><td>3</td><td>2</td></tr><tr><td>by Operating System</td><td></td><td></td></tr></table> <p>*Single-sided floppy disks</p>		5¼"	8"	Tracks	40	77	Sectors/track	18	26	Bytes/Sector	128	128	Disk Capacity	81K	241K	after formatting			# Tracks used	3	2	by Operating System		
	5¼"	8"																								
Tracks	40	77																								
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Bytes/Sector	128	128																								
Disk Capacity	81K	241K																								
after formatting																										
# Tracks used	3	2																								
by Operating System																										
	XEROX PRINTER <ul style="list-style-type: none">• Variable pitch• 40 characters per second print speed• Interchangeable print heads• Interchangeable ribbons	HARD COPY OUTPUT <ul style="list-style-type: none">• 13 inch line width• Choice of tractor or friction feed• Daisy wheel print element• ½ line vertical increment• 1 to 9 line spacing																								

Z80 is a trademark of Zilog, Inc., with whom the publisher is not associated.

A TECHNICAL VIEW

GENERAL

The modular design of the 820 system enhances the flexibility provided by the CP/M Operating System. The combination of operations provided by the system makes it one of the most adaptable on the market. This flexibility allows the system to be tailored to the needs of each user.

PROCESSOR

The processor is softloaded and uses a Z80 based microprocessor with 64K RAM and 4K ROM memory. The system monitor controls the essential functions of initializing and controlling all system input/output resources, and also provides commands that can be used to assist in programming. (Details on page 30.)

Three undedicated ports are standard on the 820: dual serial ports are located at the back of the display unit, and an additional dual parallel port is located inside the display unit. These allow printers, communication devices and other peripheral equipment to be interfaced with the system. (Details on page 28.)

RANDOM ACCESS MEMORY (RAM)

The 820 system comes complete with 64K RAM. Up to 56K is user definable resulting in a great range of possible applications, from writing a letter to complex scientific calculations. (Details on page 27.)

VIDEO DISPLAY

The 24 line, 80 character display exceeds industry standards for desktop computers, and equals industry standards for small word processing systems. Easy viewing of the 7×10 dot matrix white on black characters is enhanced by an adjustable brightness and high quality flicker free display screen.

KEYBOARD

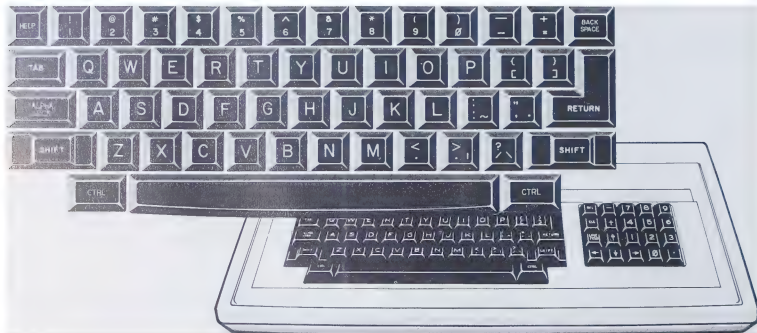
The Xerox 820 uses a standard 96 character ASCII keyboard. Additional keys are conveniently located to the right of the keyboard. A cursor control provides easy access to any point on the screen. A 10 key numeric keypad is included for convenience and speed in typing statistical material.

DISK DRIVES

Two 5¼" disk drives allow you to store up to 81K of typed material per disk side. For increased capacity, two 8" disk drives provide for 241K of typed material per disk side. The disks are soft-sectored and when initialized will have 40 tracks on the 5¼" disk and 77 tracks on the 8" disk.

THE 820 KEYBOARD CONVENIENT BY DESIGN

The 820 keyboard has been designed for operator convenience. The keyboard is divided into two sections, a standard typewriter style section, and a special functions section.



The standard typewriter keyboard allows those with previous typing experience to rapidly become familiar with the 820 system. Standard typing key functions are maintained (space, return, etc.) while other keys are enhanced or added to provide access to special features.



The HELP key is a unique feature of the 820 system, and its appearance on the keyboard demonstrates Xerox's commitment to making this a truly "friendly" system. Pressing the HELP key tells the 820 word processor that you would like more information.

A TAB key is provided to allow easy formatting of documents and tables.

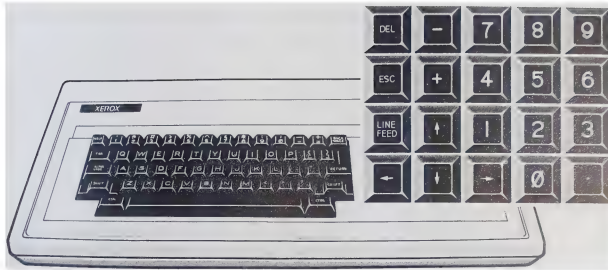
The ALPHA LOCK key locks only the alphabetical keys thus allowing you to type upper case letters and numbers at the same time.

Type in a wrong character? Just press BACKSPACE and it's gone! Then press the desired character.

The CTRL keys located on either side of the space bar allow almost every key on the board to have a second or even a third meaning. The CTRL key is used in conjunction with the alphabetic keys to input standard ASCII codes.

SPECIAL FUNCTION KEYS

The special function key pad to the right of the standard keyboard provides additional keys for special applications, without cluttering up the standard typewriter layout.



Several special function keys have been grouped in this section for your convenience.



Similar to the backspace key in nature, the DELeTe key erases while moving the cursor to the right. This feature makes corrections in the word processor mode very simple.



The ESCape key is used for sending special commands to the system in both the word processor and CP/M modes.



The LINE FEED key is used to advance the paper without typing a carrier return. It also performs specific functions in some programming languages.



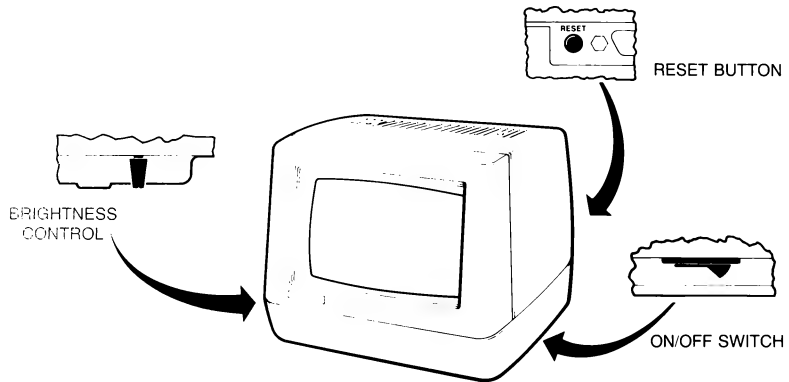
These keys are primarily used with the numeric key pad while entering statistical data. Many accounting packages allow you to use these keys as debit and credit keys.



Cursor control keys allow the cursor to be positioned at any point on the display screen, so you can go directly to the point at which a revision is to be made.

FLICKER-FREE DISPLAY

The quality flicker-free screen selected for the 820 provides easy viewing for the operator. The 24 line, 80 character display is equal to the industry standard for low cost word processors, and exceeds the industry standards for desk-top computers. The display unit of the XEROX 820 also contains the processor for the system which is softloaded and uses the Z80 based microprocessor with 64K RAM memory and 4K ROM.



ON/OFF SWITCH

Conveniently located out of the way under the edge of the right side panel, this switch controls power for the display and the central processor. It's location prevents accidental power turn off.

BRIGHTNESS CONTROL

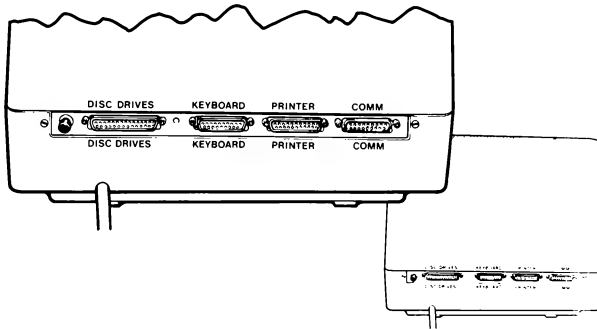
The intensity of the display can be adjusted by the brightness control located under the edge of the left side panel. The control allows you to adjust screen intensity for maximum clarity and comfort.

RESET BUTTON

The reset button, positioned at the rear of the unit is used for reinitializing the softloaded operating system when changing operating modes. Pressing this button tells the 820 you want to start over (warm boot).

VERSATILE INPUT/OUTPUT PORTS

The standard 820 system is equipped with six ports for input and output. Four of the ports are located on the back of the display unit, as shown below. Two of the four ports are used for the standard keyboard and disk drive system components. The fifth and sixth ports are located inside the display unit. (Detailed information on port assignments is given on pages 28 and 29.)

**DISK DRIVE**

Used for connection of either the 8" or the 5¼" disk drives.

KEYBOARD

Used for connectin of the keyboard, which is where data is input.

PRINTER

A serial printer may be connected to this standard RS-232 port.

COMM

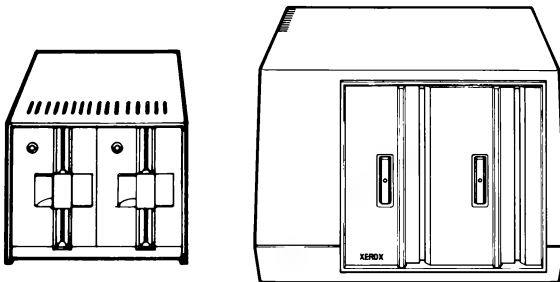
This port can be used for standard RS-232 communications input output.

PARALLEL PORTS

The dual parallel port inside the display cabinet is provided for the convenience of users who wish to use a parallel printer or other parallel input output devices.

CHOICE OF DISK DRIVES

The 820 system comes optionally configured with 5¼" or 8" disk drives. The disk drives offer high data storage capacity, fast data retrieval, and allow data to be accessed in random order.



The two drives are very similar in operation, but differ in physical appearance. The following paragraphs describe how disks are inserted into the two types of drives.

- The 5¼" drive is opened by pushing the right hand side of the latch which is over the drive opening. Once a disk is inserted into the drive, the latch is closed by pushing the left side of the latch until it clicks into place.
- The 8" drives are opened by pressing on the oblong button covering the disk door. There is a small red light on the oblong switch. To close the door, pull the door to the left until it latches.

When purchasing disks, specify:

5¼" 40 track, soft sectored floppy disk

8" 77 track, soft sectored floppy disk

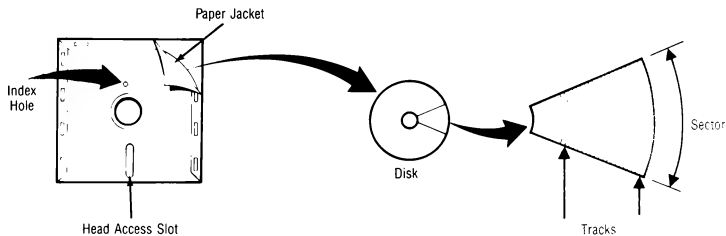
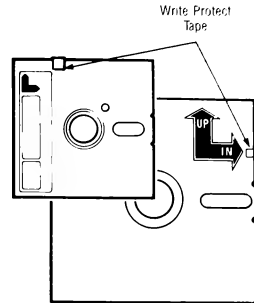
If you have an 820 disk drive that is double-sided, be sure you purchase disks that are **certified** for use in double-sided drives.

FLOPPY DISK STORAGE

The disks are similar in looks and operation to a phonograph record. They are thin and flexible (hence the name Floppy Disks) and are sealed in a stiff paper jacket. The paper jacket covering the disks permit them to be handled with relatively few precautions.

The disks have a write protect tape which can be used to protect against accidental loss of data by overwriting.

The disks are placed in the disk drives, and as information is to be stored or retrieved, they are rotated at high speed. A pick up head is moved radially along the head access slot, and can be positioned over any portion of the rotating disk.



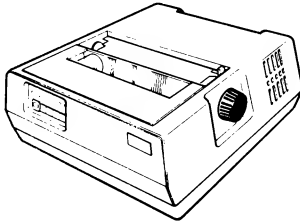
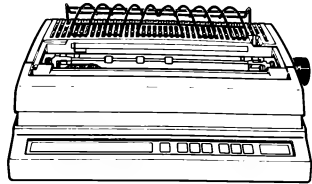
Before the 820 can use a disk, it must format (initialize) it. The format of the disk allows the 820 to quickly find and retrieve data from the disk.

When a disk is formatted (initialized), it is partitioned into tracks as illustrated above. Each track is divided into pie shaped wedges, called sectors. This arrangement allows each segment of the disk to be referred to be sector and track. Just like the needle and tone arm of a phonograph turntable, the pick up head can be placed over any track, without having to read (play) intermediate tracks. This random access feature allows rapid access to the data stored on the disk.

PRINTERS

OPTIONAL XEROX 630 PRINTER

The Xerox 630 Printer is recommended for the 820 system. This daisywheel printer produces high quality copy at a rate of 40 characters per second. The 630 makes full use of the 820 word processing capabilities; including superscripts, subscripts, and print pitch (10 or 12).

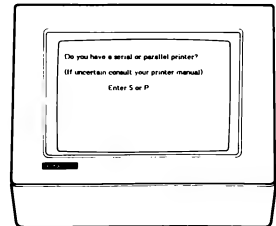


OTHER PRINTERS

The Xerox 820 system will interface with most printers designed for use with microprocessors. Both serial RS-232 and parallel (Centronics compatible) input/output ports are provided for systems interface. Generally, daisy wheel printers will provide better print quality than matrix printers, but both are compatible with the 820 system.

FRIENDLY INTERFACE

The Xerox 820 system provides a printer installation kit that gives detailed instructions for the installation of non-Xerox printers (see Appendix C). The kit includes a prerecorded disk that steps you through the software changes.



USING THE 820

The XEROX 820 has been designed for ease of installation and quick and efficient operation. The capabilities offered by the system are accessible through simple commands. Once the system is in operation, you can change software options by pressing the RESET button and inserting the appropriate disk.

The basic areas of operation (listed below) are discussed in this manual. Specific instructions for different software packages are provided in the manuals supplied with each package.

INSTALLATION

The individual plug-in system components are easily interconnected. Installing the 820 is less difficult than installing many of today's component stereo systems.

DIAGNOSTICS

You can quickly verify that the system has been installed correctly by using the Diagnostic Exerciser Disk. Xerox provides this disk at no additional charge.

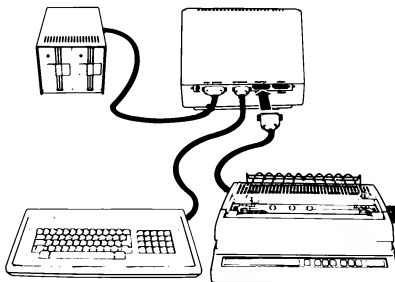
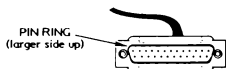
MODE SELECTION

The 820 offers several operating modes for different kinds of tasks, i.e., word processing is one mode, typewriter is another, CP/M another, etc. These operating modes make the 820 one of the most versatile pieces of equipment in today's office products field.

INSTALLATION IS AS EASY AS 1, 2, 3

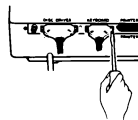
1. Plug components into back of screen.

Be sure to turn the plugs so that the larger side of the pin ring is up before you plug them in.



2. Secure the plugs with a screwdriver.

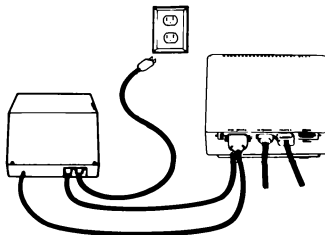
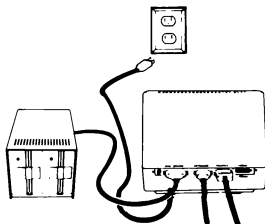
Be careful not to overtighten the screws.



3. Plug the units into AC outlet.

If you have 5 1/4" disk drives, plug the power cord on the screen into an AC outlet.

If you have 8" disk drives, plug the power cord on the screen into the back of the disk drive, then plug the disk drive into the AC outlet.



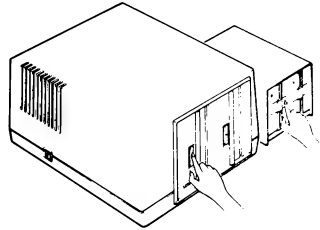
Note: If you have a printer with your 820, you'll need to check the installation instructions for the printer and then plug the printer into an AC outlet.

GETTING STARTED ON THE 820

Once the system is installed, the equipment is ready for use. The display, printer and 8" disk drives have ON/OFF switches. A simple flip of the switch and the system is ready for operation.

STEP 1

Open both disk drives and remove any disks in the drives.

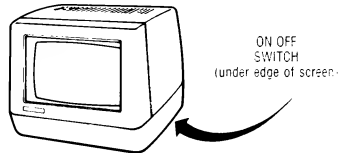


STEP 2

Turn on the display/processor (the switch is located under the right hand edge of the screen, near the back.)

If you are using the 8" disk drives, turn on the power switch located on the lower left hand side of the drives.

The word XEROX will then appear on the screen. If it does not, try adjusting the brightness control located under the left edge of the screen, near the front.



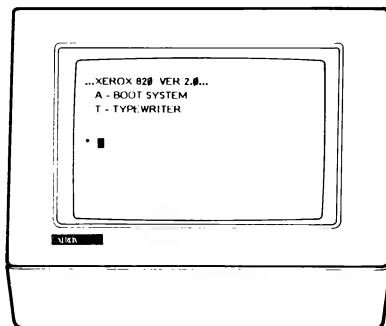
STEP 3

If you just installed your 820, you can use the Diagnostic Disk to check it out. See the instructions on page 24.

CHOOSING THE MODE OF OPERATION

After turning your 820 on, you need to tell it how you want to use it. You have a choice of using it as a typewriter, a word processor, a computer or a data terminal.

To use the 820 like a typewriter, you don't need any additional software. To use the 820 in any of the other modes, you'll need the appropriate software disk. The message on the 820's screen tells you that you can type a **T** to use it as a typewriter or an **A** to load (boot) the software option of your choice.



STEP 4

Tell the 820 what you want to do next:

- Type the letter **T** and press the **RETURN** key to use the 820 as a typewriter.
- OR, use the **A** instruction to load the software option of your choice, as described on the opposite page.

TYPEWRITER—The 820 may be used as an electric typewriter simply by entering the typewriter mode. Once this mode has been selected, any information typed on the standard 96 character keyboard will print immediately. In this mode, nothing will be recorded on disk or displayed on the screen.

As a typewriter, the 820 uses margins of 1 and 65, with tabs set every five spaces. If you want to change these settings, you can use the instructions below.

SET LEFT MARGIN by pressing the **SPACE** bar to move to the desired position, and pressing **ESC** key then **9**

CLEAR ALL TABS by pressing **ESC** key then **2**

SET A TAB by pressing the **SPACE** bar to move to the desired position, and pressing **ESC** key then **1**

USING SOFTWARE DISKS

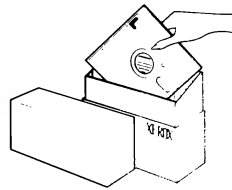
The operating strength of the 820 is derived from its capability to use existing software packages. The 820's software library includes packages that make it operate like a word processor, a desk-top computer and a data terminal. As a data terminal, the 820 may be used to transmit data (e.g., single commands or lengthy files) to other communications devices, such as another 820 or a host computer.

The steps below tell you how to load software into the 820's memory. Begin with a disk that has Word Processing or CP/M software on it.

STEP 5

Select the disk with the software you want to use. The disk must have either CP/M or Word Processing software on it.

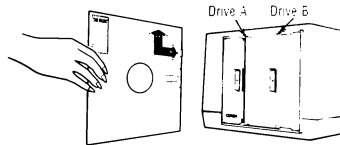
To protect your software disk from accidental erasure, it is a good idea to write protect the disk. (For 8" disks, the write protect tape should be off, while 5¼" disks should have the tape left on. See page 13 for location of tape.)



STEP 6

Insert the disk in the left disk drive.

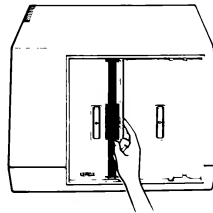
The 820 disk drives are referred to as A and B. Drive A is on the left and Drive B is on the right. When you first load CP/M or Word Processing, you put the software disk in Drive A.



STEP 7

Close the disk drive, type the letter **A** and press the **RETURN** key.

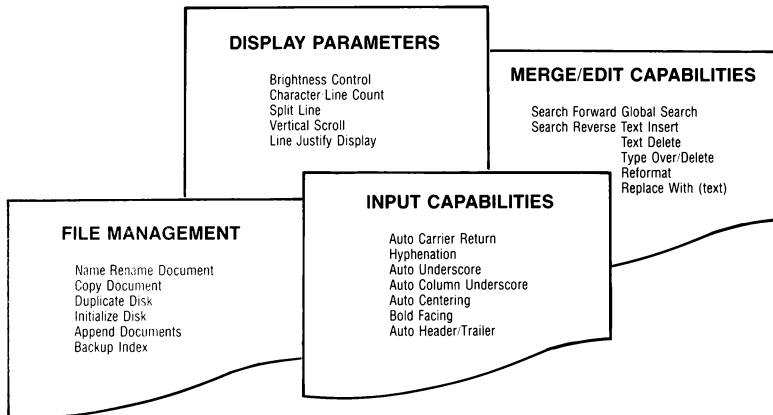
Typing **A** and **RETURN** tells the 820 to load the software into memory.



THE 820 AS A WORD PROCESSOR

When the Word Processing software has been loaded, the 820 is ready to use as a word processor/text editor. Many of the 820's features are currently only available on much more expensive systems.

The word processing features are accessed through menus and easy-to-understand messages and prompts. Training is completely self-paced and takes only a few hours. The **HELP** key can be used to bring up additional information about the features in the menus.



The Word Processing software is based on MicroPro International Corporation software, licensed to Xerox by MicroPro International Corporation, San Rafael, California 94901.

MENUS DIRECT OPERATOR ACTIONS

Using your 820 is like ordering food in a restaurant. When you sit down in a restaurant, you're usually handed a menu which is divided into several categories.

Appetizers
Entrees
and so on

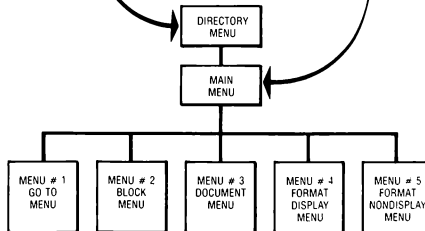
When you sit down at your system, you're also given a selection of menus. Your first menu is similar to the Appetizer section (it lists "starting" options). On the 820 Processor, this menu is called the "Directory". By responding to the menu selections you can use each of the many word processing features available.



May 1, 1980
Editor: [illegible]

This is the DIRECTORY MENU	
A -- WORK ON A DOCUMENT FILE	H -- run a program for:
B -- change disk drives	checking disk space, copying a
C -- delete a file	disk & seeing B drive directory
D -- turn directory off (ON)	ESC key -- restart software
E -- edit a program	HELP key -- change help level
F -- print a file	CTRL () -- scroll directory down
G -- rename a file	CTRL (-) -- scroll directory up
You may touch any key shown above.	
DIRECTORY of disk B	
EDIT	RULER

B:FILENAME PAGE 1 LINE 1 COL #1		INSERT ON
MAIN MENU		HELP for assistance
1 -- go to menu	7 -- delete this line	F -- change mode (up)
2 -- block menu	8 -- insert line here	F -- scroll up (present)
3 -- document menu	9 -- insert mode (on off)	G -- scroll down (present)
4 -- format (display)	0 -- repeat next command	J -- find
5 -- format (nondisplay)	-- scroll up line	K -- find & replace
6 -- reformat paragraph	-- scroll down line	L -- repeat find & replace
You may type now -or- give a command using CTRL - and key shown (ESC)		



THE 820 AS A DESK-TOP COMPUTER

The 820 becomes a desk-top computer when the CP/M 2.2 Operating System disk is inserted. CP/M provides a highly flexible operating system for system execution. Its purpose is to execute user commands and to allow the user a universal means of access to hardware resources.

Listed below and on the next page are some of the common functions you can perform with CP/M commands and the programs on the CP/M disk.

After you load the CP/M Operating System, you can use any of the CP/M application software packages (such as an accounts payable package, a financial spread sheet, a sorting program, etc.). Specific instructions can be found in the applications package manual.

To look at the contents of your CP/M disk, you use the DIR command. The names of all the files on the disk will display as shown below. The filenames will be separated by colons.

A:STAT COM:PIP COM:LETTER :SYSGEN COM

When you type a filename that displays like this, you replace the spaces with a period and type **STAT.COM**

When you type a filename that displays like this, you simply type **LETTER**

FUNCTION	CP/M COMMAND TO USE
Check Disk Space Available	Start with CP/M disk loaded in left drive. Insert disk to be checked in right drive. Type STAT B: (or type STAT B:*,* to check space of each file) and press RETURN Or, to check space on CP/M disk in left drive, type STAT and press RETURN
Copy CP/M onto a Software Disk (Normally, you'll use this procedure to copy CP/M onto a disk which already has other software or files on it.)	Start with CP/M disk loaded in left drive. Insert the other disk in the right drive. Type SYSGEN and press RETURN Type the letter A and press RETURN Wait for "FUNCTION COMPLETE" message Type the letter B and press RETURN Wait for "FUNCTION COMPLETE" message Press RETURN
Copy Files or Software	Start with CP/M loaded in left drive. Type PIP and press RETURN Remove CP/M disc and insert the disk to be copied in the left drive. Insert the disk to receive copy in right drive. Type B:=A:filename (substitute your file's name) and press RETURN Or, type B:=A:*,* (to copy all files on the disk) and press RETURN Insert CP/M disk and press RETURN when screen displays an asterisk (*)
Copy an Entire Disk (This will copy CP/M and any files and software on the disk. It will erase everything on the disk receiving the copy. If the receiving disk is new, it should be initialized before copying.)	Start with CP/M disk loaded in left drive. Type COPY and press RETURN Remove CP/M and insert the disk to be copied in the left drive. Insert the disk to receive the copy in the right drive. (If your disk is double-sided, type the letter N) Press RETURN Wait for COPY COMPLETE message and press RETURN

FUNCTION	CP/M COMMAND TO USE
Display a Directory of Files on Disk	Start with CP/M loaded in left drive. Insert disk with files in right drive. Type DIR B: and press RETURN Or, type DIR and press RETURN to see files on the CP/M disk.
Display a File on Screen	Start with CP/M disk loaded in left drive. Insert disk with file in right drive. Type the words TYPE B:filename and press RETURN If the file is on the left disk, type the words TYPE filename and press RETURN Note: Touching the SPACE BAR will stop the display of the file on the screen
Erase a File (You can use the procedure for formatting a disk if you want to erase all files on the disk.)	Start with CP/M disk in left disk drive. Insert disk with file to erase in right drive. Type ERA B:filename and press RETURN Wait for the A to display on the screen
Format (initialize) a New Disk	Start with CP/M disk in the left drive. Insert new disk in the right drive. Type INIT and press RETURN (If you have double-sided disks, type N and press RETURN) Type B and press RETURN twice. Press the SPACE BAR when the initialization is finished.
Print a File (When the print command is turned on using CTRL + P, it will remain on until you turn it off)	Start with CP/M disk in left drive. Insert disk with file in right drive. Hold down CTRL key and press P Type the words TYPE B:filename (substitute your file's name) and press RETURN Or, if the file is on disk in left drive, type the words TYPE filename and press RETURN
Rename a File	Start with CP/M disk in left disk drive. Insert disk with file to rename in right drive. Type REN B:new filename = B:bold filename and press RETURN
Run a Program	Start with CP/M in left disk drive. Type filename (substitute your program's name (like STAT) and press RETURN Or, if the program is on the disk in the right drive, type B:filename and press RETURN

USING THE DIAGNOSTIC DISK TO CHECK THE SYSTEM

The 820 comes with a Diagnostic Exerciser Disk. You can use this disk to check that the 820 is in proper working order. The disk will check the different components of the system and display a message if it finds a malfunction.

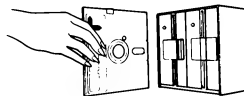
STEP 1

Make sure you have an initialized 820 disk and the Diagnostic Exerciser Disk. The write protect tape should be **on** the 8" disk and **off** the 5¼" disk.



STEP 2

Insert the Diagnostic Disk in left drive and the other disk in right drive



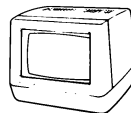
STEP 3

Type the letter A and press RETURN



STEP 4

Watch the screen for messages, as shown on the opposite page.



The diagnostic disk will begin to check out the system. Be careful not to touch any keys on the keyboard while the test is running. Touching a key can stop the test. Messages will be displayed on the screen. If any test results in a response other than that shown on the next page as the correct response, the system should be serviced by an authorized Xerox technician.

DIAGNOSTIC TEST RESULTS

TEST	CORRECT RESPONSE
FIRST MEMORY TEST	PASSES COMPLETE = 0001; COUNT OF ERROR BYTES = 0000 PASSES COMPLETE = 0001; COUNT OF ERROR BYTES = 0000
SECOND MEMORY TEST	PASSES COMPLETE = 0001; COUNT OF ERROR BYTES = 0000 PASSES COMPLETE = 0001; COUNT OF ERROR BYTES = 0000
DISK TEST	0 read/write error detected 0 seek errors detected
SCREEN TEST	WATCH the screen as it displays the screen test. The test pattern should fill the screen with characters. (The border around the test pattern will remain black.) If you do not have a printer, this step completes the test.
PRINTER TEST	The printer will print a test pattern with the alphabet and numbers.
FINISH	DIAGNOSTIC COMPLETE. RESET TO CONTINUE

HOW IS THE 820 DESIGNED?

BASIC CONCEPT

The 820 system is designed to provide maximum versatility. This is accomplished by minimum use of fixed functions and maximum use of user selected functions. This approach to system design provides a "today" computer that has the capability to make maximum use of tomorrow's software. Xerox is committed to meeting the customer's future needs by providing expanded software packages, upward compatibility with other Xerox products and standard interface with the Xerox local communications network—ETHERNET.

HARDWARE DESIGN

The heart of the 820 system is a 64K random access memory (RAM) Z80 microprocessor with a switchable 4K Read Only Memory (ROM). The 4K ROM unit is switched into the system at startup to provide the system with the basic ability to load the user selected functions into the central processor unit (CPU). Only seconds after turn-on the 820 CPU is performing the user defined tasks. At the touch of a key the 820 converts from an electric typewriter to a powerful word processor or any of the many scientific processing systems available today. And tomorrow, the 820 will be as up-to-date as the latest software; because the functions of the 820 are completely controlled by user selected software.

SPECIFICATIONS

Display Screen:

24 lines, 80 characters per line displayed white on black background, with brightness control.

Keyboard:

Separate unit from Display Screen.

Printer Speed:

Up to 40 characters per second, bi-directional.
Writing Line: 13" standard
Platen: 14.5" standard
Ribbon Cartridges: Interchangeable film or fabric.

Size & Weight

Display Unit:	Height 12.87", Width 15", Depth 13.5" Weight 30 lbs.
Keyboard:	Height 3.75", Width 20", Depth 9.5" Weight 10 lbs.
Disc Unit (5¼"):	Height 6.7", Width 8", Depth 9" Weight 10 lbs.
Disc Unit (8"):	Height 11.25", Width 13", Depth 22.75" Weight 48 lbs.
Printer:	Height 8.5", Width 24.5", Depth 19" Weight 56 lbs.

Disk Storage Capacity:

5¼" Floppy (dual)
92K unformatted (40 pages approx.) per drive, per side
8" Floppy (dual)
300K unformatted (120 pages approx.) per drive, per side

Electrical Requirements:

System Voltage:	90-132 VAC single phase (two wires plus ground)
Frequency:	59.5-60.5 Hz
Current:	One Display (Controller, Display, Keyboard and Printer) can be connected to a 15 amp circuit.
Amps:	System with 5¼" Disk Drive 1.5 amps System with 8" Disk Drive 3 amps Xerox 40 cps Printer 2 amps

Environmental Requirements:

Operating:	50° to 90° F 20% to 80% humidity
Non-operating:	-20° to 150° F 15% to 90% humidity

TECHNICAL ASPECTS OF STARTUP

LOADING THE MONITOR

The 820 system is initialized at "power on" or at the pressing of the reset button. Upon this command the low page of RAM is switched to the monitor ROM and copied into the high page (4K) of RAM. The low page is then switched back to RAM for use as the stack register.

INITIAL FUNCTION SELECTION

After it is loaded, the monitor will display a screen request for the user to select the basic operating mode. The user may select typewriter (T) mode or system boot (A). In the typewriter mode the 820 keyboard interacts with the printer in electric typewriter fashion.

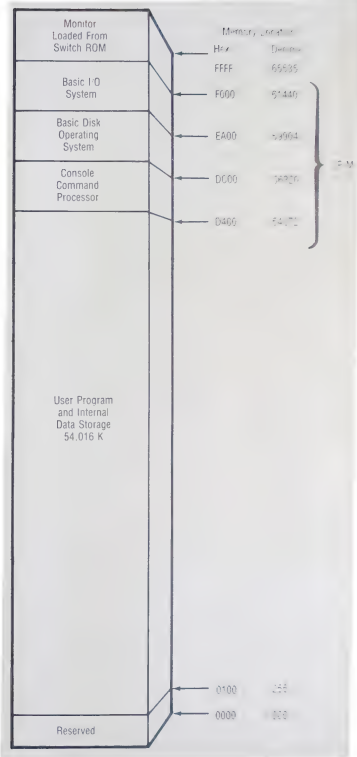
SYSTEM BOOT MODE (A)

If the user selects the boot mode (A), the monitor will load an executable program of fixed length from disk A, Track 0, Sector 1. This program is loaded into the CPU location 80 hex. The monitor then transfers control to the loaded program. This initial program is a loader routine for the user selected system function (word processor, CP/M, etc.). It is specifically designed to load the disk software into memory and begin execution. The memory locations occupied by the initial loader program are utilized by the software as a utility or stack register area.

DESIGN CONCEPT

The design concept of initial monitor loading of a specialized system loader is one of the key elements in providing the user with maximum system versatility. The association of loader routine and system software insures the user that the 820 system can respond to any computing need, today or tomorrow.

MEMORY MAP FOR CP/M SYSTEM



A VERSATILE SYSTEM MONITOR

BASIC CONTROLLER

The monitor provides two essential functions for the Xerox 820 system. It is the initial software level of the computer and it contains the routines that initialize and control all the basic system input/output resources. The "front panel" functions of the monitor include commands to display and alter the contents of memory and I/O ports, to begin execution at a given address, and to bootstrap programs from disk. The basic I/O functions of monitor provide driving routines for the built-in CRT display and keyboard input, and the floppy disk controller. In this capacity the monitor is always active, even when application programs like the CP/M disk operating system have control of the CPU.

A VERSATILE SYSTEM MONITOR

FILL (F)	The fill command allows blocks of memory to be filled with a fixed data constant.
COPY (C)	The copy command allows blocks of data to be moved in memory.
GO TO (G)	The go to command allows control of the CPU to be passed to another program (i.e., begin execution of software).
READ (R)	The read command allows individual disk sectors to be read into memory and displayed on the console.
BOOT (A)	The boot command is used to load and begin execution of a one sector long bootstrap loader from the first sector on disk drive unit A.
TYPEWRITER (T)	The typewriter command establishes a direct link between the keyboard and the printer.
INPUT (I)	This command allows the contents of input ports to be read.
OUTPUT (O)	This command allows the output ports to be written to.

128 CHARACTER DISPLAY SET

CHARACTER DEFINITIONS

Each character is defined by a unique eight bit code which is represented by a hexadecimal code 'XY' where X represents the 4 most significant bits of the code and Y represents the 4 least significant bits of the code.

There are a total of 128 characters in the font set. Therefore, Y represents a hexadecimal number from 0 to F, and X represents a hexadecimal number from 0 to 7. Therefore, the complete font set is defined by codes from 00 to 7F. If the most significant bit of the eight bit code is set to '1', then the complete font set is duplicated with the blink attribute set. The blinking set of characters is then defined by codes from 80 to FF.

SPECIAL EFFECTS

With a Xerox 630 printer, the character set is further enhanced by the overstrike capability. This feature allows the generation of BOLD FACE type and the combination of characters for **underlining** and unique symbols.

	Y	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
X																	
0		□	c	■	⊕	§	½	¼	±	◀	▶	◀	▶	◀	▶	◀	▶
1		³	²	◇	—	↯	•	⊥	μ	+		◀	◀	◀	◀	◀	◀
2			!		#	\$	%	&		()	*	+		-		
3		0	1	2	3	4	5	6	7	8	9				(=	?
4		“	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
5		P	Q	R	S	T	U	V	W	X	Y	Z	[]		
6			a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
7		p	q	r	s	t	u	v	w	x	y	z	{		}		•

CARE OF THE 820 DISKS

HANDLE WITH CARE

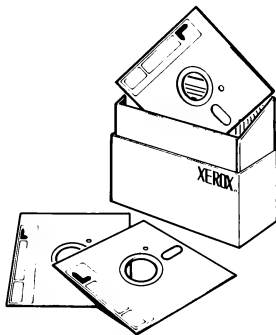
The 820 disks are designed for maximum recording fidelity and long life. However, it is very important that the user exercise care in the handling of the disks. The disk is very similar to an audio or video magnetically recorded tape. Dust, oil, scratches, or wrinkles can permanently ruin a disk.

PRECAUTIONS

- Store the disk vertically in its storage envelope away from magnetic fields (such as electrical equipment with motors or transformers), heat, sunlight, dust and cigarette ashes.
- Remove the disk before turning off the disk drive and do not insert the disk until after the drive is on.
- Do not attempt to clean the disk surface or touch it in any manner. Disks should be handled by the jacket only.
- The disk jacket should not be labeled with a hard point, writing instrument. Writing pressure can damage the disk inside the jacket during the labeling process.

LABELING DISK

Disk labels should be confined to permanent information only. Each storage disk may be assigned a permanent number which can be cross referenced to contents. This labeling system allows the user to change disk contents without changing the jacket label. In most cases the disk will last longer than the usefulness of the data stored on it.



NON-XEROX PRINTERS

INSTALLATION KIT

The Xerox 820 Printer Installation Kit includes detailed instructions and a disk (called MODPTR) for the installation of either a serial or parallel printer. The disk is used to modify the Xerox Word Processing and CP M disks to use the type of printer being installed. This modification is necessary to insure that the software sends output data to the printer in a format that the printer can receive and understand. Also included in the Printer Installation Kit are instructions and the hardware necessary to interface the 820 with a parallel printer.

MODIFYING THE SOFTWARE DISKS

The software disk modification is a simple step-by-step procedure that is explained in the Installation Kit Manual. The software disk to be modified is loaded in the left disk drive and the MODPTR disk in the right. The installation manual gives you a sequence of keystrokes that tell the 820 which software disk is being modified and what type of printer is being installed. The 820 will respond with screen messages and questions. The modification procedure for serial printers and certain parallel printers (Epson MX-80, Centronics 737 739 or Axium IPM Miniprinter) is very simple. Software modification for other parallel printers requires that you supply the printer's "Protocol" and the "Baud Rate".

INSTALLING THE PRINTER

The installation of the printer is explained and illustrated in the Installation Kit Manual. For serial printers the procedure is as simple as plugging one end of the cable into the printer and the other into the 820 (being sure that both units are "off" and unplugged). The installation of parallel printers requires the connection to be made inside the 820 display unit. The manual illustrations and kit hardware make this an easy task. The removal of two screws (after turning power "off" and unplugging the screen) allows access to the internal parts of the display unit. The installation of the three "Jumpers" (included in the installation kit) is clearly illustrated. Once the "Jumpers" are installed, the printer cable is plugged into the internal 820 parallel port and a ground wire attached. Replacing the cover of the display unit completes the installation.

GLOSSARY OF COMPUTER TERMS

Assembly Language A language similar in structure to machine language, but made up of mnemonics and symbols. Programs written in assembly language are slightly less difficult to write and understand than programs in machine language.

BASIC Stands for Beginner's All-Purpose Symbolic Code. BASIC is one of the most popular "high level" computer languages available. It is referred to as high level because it makes use of English language commands to write the program.

Baud Refers to the rate at which digital information is transmitted or communicated to another system. The baud rate is given in bits per second, and since each character has 10 bits on most systems, the baud rate must be divided by 10 to get characters per second. For example, a baud rate of 1200 will transmit 120 characters per second.

Bit The smallest piece of information a computer can handle. A bit represents either an on or off condition in the system's electronics (or 0 or 1 in the binary number system). Several bits (usually 8 or 16) are combined to make a character, just as several characters are combined to make a word.

Bug Used to refer to a problem or malfunction in a program or a system.

Bus A port or group of ports (plugs or electronic circuits) that provide the capability to hook two or more microprocessors or input/output devices together. The port includes lines for data, memory address and processor control.

CP/M* Stands for Control Program for Microprocessors. CP/M is a registered trademark of Digital Research Corporation, and is an industry standard operating system for small computers. CP/M tells the components of your system (the keyboard, disk drives, screen and printer) how to work together: how to display a character typed on the keyboard on the screen, how to record information typed on the screen on the disk, how to print information on the disk at the printer, etc.

CPU Stands for Central Processing Unit, which is a computer's main processing center. The CPU is the brains of the system: it holds the control system, arithmetic and logic units and some memory. The CPU is where information from the disk and keyboard are processed.

CRT Stands for Cathode Ray Tube, which is the system's screen or display device.

Debug Refers to the process of finding and correcting mistakes or problems in a software program.

Glitch An error or problem in the computer components. Usually refers to a problem caused by line noise (inconsistencies in the electricity) or electromagnetic interference.

High-level Language Any programming language that uses English-like commands, such as BASIC, COBOL, FORTRAN, Pascal, etc. These languages are easy for beginners to learn. The computer must change the commands into machine language through software programs called interpreters or compilers.

D

APPENDIX

I/O Stands for Input/Output and refers to any device that sends information to and accepts information from the computer. A disk drive is an example of an I/O device.

K Refers to Kilo or 1,024 in computer terms. Frequently used to describe memory capacity in bytes. A disk that holds 81K, holds 82,944 characters.

Machine Language Refers to the digital or binary code that is the language a computer works in. When you use a high-level language (like BASIC), the software must convert your instructions into machine language before the computer can take action.

Modem An abbreviation for the term "modulator-demodulator". A modem is a device used to change computer signals into signals that can be sent along a telephone line. When the signals are received by another modem, they are translated back into computer signals.

Operating System Refers to the group of programs that control the computer's internal functions. (Also see definition for CP/M.)

Peripheral An external device that communicates with a computer. Printers and disk drives are examples of peripherals.

Programming Refers to the process of writing instructions (a program) in a language that a computer can understand and act on.

RAM Stands for Random Access Memory, which is the portion of the computer's memory that is used for programs, data manipulation and temporary data storage. When you load a program into memory, it goes into RAM. Since RAM is only a temporary memory, everything in it is lost when the power is turned off.

ROM Stands for Read Only Memory, which is the portion of the computer's memory which is pre-programmed and not loaded from a software disk. The information in this memory tells the computer how to operate internally. For example, the message you see on the 820's screen when you turn it on comes from the ROM.

Software Refers to computer programs which can be loaded into memory from a disk (or other media). The software can be an Operating System (such as CP/M), programs for accounting or word processing, or a BASIC language program that you wrote yourself.



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